Agriculture Canada

Publication 1774/E

Maple Syrup

Maple farming has changed considerably in recent years. Although the days are gone when you could see a child drinking maple sap from a pail, or a horse pulling a sled with a keg full of sap, the finished product remains the same popular treat.

Maple syrup is a distinctly Canadian product. We produce about 70% of the world's supply. Quebec accounts for 90% of this, with New-Brunswick, Nova Scotia and Ontario producing the remainder. The industry is fairly small in the United States and is found mainly in Vermont, New York, New Hampshire, Massachusetts and Maine.

History

Long before white settlers came to Canada, Indians were making a dark sugar from the sap of maple trees. Their methods were primitive. In the spring, they made a diagonal incision in the trunk and inserted a strip of bark at the lower end of the cut to serve as a spout.

The sap was collected in birch-bark containers and then poured into a hollowed-out log. The Indians added hot rocks to start the natural evaporation. Time did the rest; the sap slowly became syrup, toffee and then sugar.

The early settlers learned from the Indians, and began making maple syrup to supplement their diets. They used spiles (spouts) and wooden pails to collect the sap, which was boiled in the open in iron cauldrons. The art has been handed down from generation to generation and is now part of our heritage. Over the years, the methods and equipment have improved. Today, maple farming flourishes and is a far cry from the original cottage industry.

The first significant innovation in maple syrup harvesting came in 1976 with the introduction of vacuum sap collecting. This was soon followed by ultrafiltration and improved farming methods. Horses and snowshoes, the symbols of the past, are now giving way to modern science and technology; reverse osmosis and pasteurization by ultraviolet radiation are just two examples.

Maple trees

There are several varieties of maple trees in North America, eastern Asia and China, but none matches the sugar maple (*Acer saccharum*) for amount and quality of sap. Found only in northeastern parts of Canada and the United States, it may grow as high as 30 m and as wide as 90 cm during its 250-year lifespan. Its wood is very hard and its bark is gray and rough. Producers also tap black, red and silver maples, but the sap is generally lower in quantity and sugar content. It requires additional boiling, resulting in a darker, more-opaque syrup and in greater fuel consumption.

Sap formation

Once the sugary sap begins to flow in the sapwood of the tree, it is time for tapping. At this moment, the sap is 97.5% water, 2.4% sugar and 0.1% minerals.

A number of factors can affect the sap's rate of flow, quantity and sugar content (which can vary from 0.5 to 10%). Other influences are tree species, height and diameter, tapping period, management, techniques employed and climatic conditions.

A hot and sunny summer with good rainfall promotes the formation of plentiful reserves of sap. A winter in which the ground is not frozen too deeply and is gradually warmed with the approach of spring contributes to a good flow. Spring weather has an even greater effect on sap production. Nights with temperatures at or below the freezing point must be followed by days with thawing temperatures (up to 8°C) so that sufficient pressure develops to make the sap flow.

A maple grove in which the trees are well spaced may produce very large maples. It is therefore important to cull and thin the plantation, spacing the saplings 6 m apart if possible. The sap from these trees is generally more plentiful and sweeter, especially when they have protection from the wind and good exposure to the sun. The best yield will be from healthy, perfect and undamaged specimens with many branches and dense foliage. Only trees producing sap with a sugar content of at least 4% are retained.

Tapping

The trees should be tapped as the sun's heat increases, snow begins to melt and roofs start to drip. This may be any time from mid-March to the beginning of April. The method used (pipes or pails) can also affect the time of tapping.

Tapping must be done carefully and without delay, to get the most sap from each tree. A brace and bit is used to bore holes about 1 m above the ground in the bark of the trees, although the height does not greatly affect the yield.

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The holes are 6 cm deep and 11 mm in diameter. Large maples may be tapped in several places, but trees with trunks less than 25 cm in diameter should not be tapped at all.

Equipment must be clean to ensure that the sap remains clear, and pails covered to protect the sap from dirt.

Collecting

The traditional method of collecting by hand is tedious and requires a great deal of time and labor. Nevertheless, because sap deteriorates rapidly in the pails and may sour if boiling is delayed, producers must make an effort to collect the sap once a day, if possible. Like other industries, maple farming has benefited from modern technology. More and more producers are using a sap-collecting system in which plastic spiles, inserted in the trees, are connected to a network of plastic pipes. The pipes are laid on a slope, and the sap flows by gravity to the sugar house. This ensures that the sap is always fresh and clear when it reaches the reservoir. Although this system represents a substantial investment, it is more hygienic and requires about 30% less labor than the traditional method.

Vacuum pumps can be used to draw the sap through the pipes if the gravity-flow is not feasible. Because they exert additional pressure on the veins of the trees, pumps increase the yield without affecting tree growth. Moreover, this makes it possible to start tapping a little earlier in the season, increasing the profit from the maple grove and stabilizing output.

Evaporation

Evaporation transforms sap into syrup. Although improved evaporation equipment has appeared over the years, the basic principle remains unchanged. The sap is brought rapidly to a boil and the temperature kept steady as the liquid gradually thickens. Evaporation that is too slow or too fast will affect the color, flavor and texture of the syrup.

At sea level, the correct temperature for evaporation is 104°C. However, since the boiling point varies with altitude, a thermometer must be used to adjust the cooking temperature. For example, in a region where the boiling point of water is 98°C (or 2°C below normal), the cooking temperature of the sap must also be reduced by 2° (to 102°C).

As the sap boils, foam forms on the surface, indicating the syrup is nearly ready. This must be removed regularly with a ladle to prevent accumulation of impurities. A densimeter can also be used to determine when the cooking should be stopped. Depending on the sugar content, 30 to 45 L of sap are needed to make 1 L of syrup (the trees on 1 ha produce about 250 L of syrup).

Until about 15 years ago, wood was the only fuel used to heat the evaporator, but many producers now use oil or natural gas to save time.

Filtering

Maple syrup must be filtered to remove impurities that could affect its appearance and flavor. It is important to check the color and adjust the density to between 66° and 67° Brix (The Brix unit of measurement indicates the risk of fermentation or crystallization). The syrup is then bottled or put in galvanized metal cans while still very hot (87°C or more). The heat sterilizes the containers and prevents the formation of mold.

Other maple products

When the syrup is boiled even longer, it becomes slightly thicker and forms maple toffee. This is delicious when served on snow. In addition, other procedures at the end of the normal cooking period will convert the syrup into maple butter or soft or hard sugar. Depending on the texture desired, the temperature of the liquid is raised or lowered at various rates, or the syrup is churned at varying speeds. A high-quality syrup that has been well filtered should be used to make these products; preferably, it should be slightly 'aged' or have been made in the previous year.

Of the various maple products, most consumers prefer syrup, since it can be served on pancakes, waffles or french toast, or included in recipes for pies, cakes and biscuits.

Grading and marketing

Consumers can find a wide range of maple products on grocery store shelves, available in containers and packages of all shapes and sizes. In its efforts to reach new markets, the maple farming industry constantly seeks to diversify its products. For example, we can now buy syrup-coated popcorn and almonds, maple-flavored soft drinks, maple syrup sundae toppings, mixtures of syrup and honey, and powdered maple sugar. No doubt more new products, recipes and syrup-based preparations will be developed and sold.

Maple syrup destined for interprovincial or export markets is graded into three categories according to color, clarity and flavor. Since the syrup must contain at least 66% solid matter, the water content cannot exceed 34%.

Under federal regulations, only products that are 100% pure may be labeled as 'maple'. The addition of coloring or other substances, regardless of quantity, precludes use of this designation. In such cases, the added ingredients must be listed clearly on the label. Each province can impose further regulations on the grading, packaging and labeling of syrup and other maple products sold retail.

PUBLICATION 1774/E, available from
Communications Branch, Agriculture Canada, Ottawa K1A 0C7

Cat. No. A73-1774/1985E ISBN: 0-662-13575-X
Printed 1985 15M-3:85

Également disponible en français sous le titre
Le sirop d'érable.